

Polyhexamethylene Biguanide (PHMB) Sanitizer

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Brought to you by the APSP Recreational Water Quality Committee

I. INTRODUCTION

This fact sheet has been designed to provide technical information on the system for using polyhexamethylene biguanide (PHMB) sanitizer for swimming pools and spas. This includes background, general characteristics, use, and safety precautions. In swimming pools, hydrogen peroxide and a compatible algicide are used in conjunction with PHMB. In spas, the algicide is not used.

II. SUMMARY OF CHARACTERISTICS

- PHMB is an organic polymeric sanitizer
- Used in conjunction with hydrogen peroxide
- Compatible algaecides are used to supplement the algaestatic activity of PHMB
- PHMB is measured using a test kit specific to PHMB
- PHMB and hydrogen peroxide have little effect on water balance
- PHMB is completely soluble in water
- PHMB is stable to sunlight and elevated pool/spa water temperature
- PHMB forms insoluble particles with some pool/spa contaminants resulting in the need for more frequent filter cleaning

III. GENERAL DESCRIPTION

PHMB is a positively charged (cationic) polymer that is normally sold as a liquid product containing 20% PHMB. PHMB kills microorganisms in pool/spa water helping to maintain a hygienic swimming environment. Like all other swimming pool and spa sanitizers, PHMB is registered with the U. S. Environmental Protection Agency (EPA). PHMB is registered in every state for use in residential pools. Public pools and spas often require additional regulatory clearances. Several states have approved PHMB for use in public pools. Before using PHMB in a

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public pool or spa, check with the local regulatory authority to determine if clearance is required or has been granted.

PHMB forms insoluble particles with some impurities in the water. Subsequently, these insolubles are trapped in the filter as the pool water is circulated. As these insolubles deposit in the filter, the backpressure will rise. Filters should be backwashed or rinsed as dictated by the filter manufacturer's specifications. In addition, the filter should be chemically cleaned at least twice a season with a PHMB compatible product. In geographical areas with long or year-round swimming seasons, more frequent chemical cleaning may be required.

Although PHMB removes some of the contaminants that enter the pool/spa water, others are not removed. Hydrogen peroxide is used regularly to oxidize these contaminants. Currently, quaternary ammonium algaecides are used to supplement the algaestatic properties of PHMB in pools and outdoor spas.

Certain classes of pool chemicals or treatment processes are incompatible with PHMB.

These include, but are not limited to:

- Chlorine/bromine sanitizers
- Copper-based algaecides
- High doses of monopersulfate (peroxymonosulfate) oxidizers
- Phosphate-based products including chelators and detergents
- Electrolytic chlorine/bromine generators
- Metal-based systems (ionizers and mineral systems)
- Corona Discharge (CD) ozone generators on pools

The pool or spa owner should consult with the supplier of PHMB if there is any question about compatibility of an auxiliary chemical or process.

IV. APPLICATION

PHMB is added to the pool/spa by pouring the product in the water evenly around the perimeter with the circulation system running. The core companion products (i.e., hydrogen peroxide and in some cases a compatible algaecide) are also liquids and should be added in a similar manner. The product labels provide a method for calculating the appropriate amounts for a given pool/spa volume.

In a properly maintained pool/spa, the concentration of PHMB should be maintained between 30 ppm - 50 ppm. The concentration is measured using a PHMB specific test kit used as per manufacturer's directions. When the level of PHMB falls to 30 ppm or less (usually 10 days - 14 days), a "top up" dose of PHMB is added to bring the level back to 50 ppm. The product label and literature provides a method for determining the appropriate dosage. In swimming pools, a weekly or biweekly maintenance dose of a compatible algaecide is typical. The dosing requirements are provided on the product label. The oxidizer, hydrogen peroxide, is typically added on a monthly or weekly basis (monthly dosage is typically to achieve an active ingredient concentration of 27 ppm) according to product label directions.

NOTE: Currently test kits measure PHMB as the product concentration, rather than the active ingredient itself. Since the typical product strength is 20% active ingredient, 30 ppm – 50 ppm product corresponds to 6 ppm – 10 ppm active PHMB.

As with all treatment regimes, proper housekeeping, maintenance and water balance chemistry must be maintained when using PHMB sanitizer. Also, as with any pool sanitizer, total dissolved solids (TDS) will build over time. Periodic partial drainage and replacement with fresh water is required to reduce TDS.

Before converting to/from PHMB to/from another chemical treatment or process, consult your PHMB supplier.

V. PRECAUTIONS

In order to safely use and handle PHMB and hydrogen peroxide products, all individuals involved in their manufacture, distribution, sale, use should be trained and knowledgeable about their properties. Safety information is available on the product label, product MSDS (Material Safety Data Sheet), and manufacturer's training materials. This safety information will include product and packaging disposal instructions and spill response information.

VI. REFERENCES

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